

CLAIMS

1. A connecting element for connecting and/or fixing an electrode with an electrode arm of a welding apparatus, comprising a base body; and a sensor selected from the group consisting of a sensor for introducing ultrasound waves into an electrode, a sensor for receiving ultrasound waves, and both.

2. A connecting element as defined in claim 1, wherein said sensor is a sensor for introducing and/or receiving of ultrasound waves selected from the group consisting of transverse ultrasound waves and ultrasound waves with predominantly transverse components.

3. A connecting element as defined in claim 1, wherein said sensor is a sensor for introducing and/or receiving of ultrasound waves selected from the group consisting of shear waves, torsion waves, and both.

4. A connecting element as defined in claim 1, wherein said sensor is arranged on said base body.

5. A connecting element as defined in claim 1, wherein said base body has a recess, said sensor being arranged in said recess of said base body.

6. A connecting element as defined in claim 1, wherein the connecting element is formed as a clamping element which is connectable with an electrode arm so that it fixes the electrode in a clamping seat.

7. A connecting element as defined in claim 6, wherein said clamping element has an inner contour which corresponds to an outer contour of the electrode; and further comprising screw means for connecting

the clamping element with a counter plate which is formed as a collar-shaped extension of said electrode arm.

8. A connecting element as defined in claim 7, wherein said counter plate is formed of one piece with said electrode arm.

9. A connecting element as defined in claim 1, wherein the connecting element is composed of a material which has same or substantially similar acoustic properties as a material of the electrode.

10. A connecting element as defined in claim 1, wherein said sensor includes a piezo element.

11. A connecting element as defined in claim 1, wherein said sensor is arranged so that the ultrasound waves are introduced into the electrode in an orientation selected from the group consisting of an orientation substantially parallel to a longitudinal axis of the electrode and an angle of smaller than 90° to a longitudinal axis of the electrode.

12. A connecting element as defined in claim 1, wherein said sensor is formed so that the ultrasound waves have a frequency smaller than 1 Nhz.

13. A connecting element as defined in claim 1, wherein said sensor is provided with a sound-influencing layer.

14. A connecting element as defined in claim 13, wherein said sound influencing layer is a layer selected from the group consisting of a sound-damping layer, a reflecting layer, and both.

15. A holding device for holding electrodes for resistance welding, comprising an electrode arm; and a connecting element which is connected with said electrode arm, said connecting element including a base body, and a sensor selected from the group consisting of a sensor for introducing ultrasound waves into an electrode, a sensor for receiving ultrasound waves, and both.

16. A holding device as defined in claim 15; and further comprising a second electrode arm with a second connecting element, formed so that a sensor for introducing ultrasound waves into an electrode is arranged in one of said connecting elements and a sensor for receiving ultrasound waves is arranged in another of said connecting elements.

17. A holding device as defined in claim 15, wherein said electrode arm has a diameter which is greater than a diameter of the electrode, said electrode arm being provided at an end side with an opening for receiving a portion of the electrode.

18. A holding device as defined in claim 15, wherein said electrode arm has a counterplate with which the connecting element is connectable for clamping of the electrode.

19. A holding device as defined in claim 18, wherein said counter plate is formed as a collar-shaped extension of said electrode arm, with which said connecting element is connectable for clamping of the electrode by screw means.

20. A connecting element device as defined in claim 1, wherein said connecting element has an opening, said sensor being cylinder-shaped and mounted in said opening of said connecting element, and also being in contact with an end side of said electrode.

21. A holding device as defined in claim 15, wherein said connecting element has an opening, said sensor being cylinder-shaped and mounted in said opening of said connector element, and also being in contact with an end side of said electrode.